AMENDMENTS TO THE CLAIMS WITH MARKINGS TO SHOW CHANGES MADE, AND LISTING OF ALL CLAIMS WITH PROPER IDENTIFIERS

1. (Canceled)
2. (Currently amended) The apparatus of claim [[1]] 10, wherein a simulation of said digital controller is calculated by the auxiliary computer.

3. (Currently amended) The apparatus of claim [[1]] 10, and further comprising computing means for calculating a simulation of the digital controller, said computer means being separate from said auxiliary computer.

4. (Currently amended) The apparatus of claim [[1]] 10, wherein an emulation of said digital controller is calculated by the auxiliary computer.

5. (Currently amended) The apparatus of claim [[1]] 10, and further comprising computing means for calculating an emulation of the digital controller, said computer means being separate from said auxiliary computer.

6. (Currently amended) The apparatus of claim [[1]] 10, wherein a the simulation is carried out in real time.

7. (Currently amended) The apparatus of claim [[1]] 10, and further comprising means for increasing a cycle time of the digital controller.

8. (Currently amended) The apparatus of clam [[1]] 10, wherein said mechanism model is ~~adapted to be~~ calculated by the auxiliary computer.

9. (Currently amended) The apparatus of claim [[1]] 10, ~~and~~ further comprising computing means for calculating said ~~machine~~ mechanism model, said computing means being separate from said auxiliary ~~downstream~~ computer.

10. (Currently amended) Apparatus for simulation of the mechanical behavior of the mechanism of machine tools or production-line machines having multiple drive controllers for driving multiple axes, said apparatus comprising:

a digital controller, said digital controller being adapted for producing respective desired axis values;

an auxiliary computer connected to the digital controller for receiving said desired axis values from the digital controller, said auxiliary computer including mathematical model means for calculating respective actual axis values from said respective desired axis values simultaneously using mathematical models of drive controllers of the respective axes, said mathematical models including models of both regulated and unregulated drive controllers, said mathematical models using said respective desired axis values; and

mechanism model means for generating a state signal using said actual axis values produced by said mathematical models of said drive controllers of the respective axes, said mechanism model means connected for receiving said actual axis values from said mathematical model means and for supplying said state signal to said digital controller as feedback, whereby both regulated and unregulated axes of the machine are simulated simultaneously. ~~The apparatus of claim 1, wherein~~

at least one of the multiple axes ~~has~~ having NC-axis drive control and at least one of the multiple axes having ~~has~~ a PLC-axis drive control, so that at least one NC-model and at least one PLC-model are used to compute the respective actual axis values, and wherein a geometric kinematic mechanism model of the behavior of the axes in the mechanism of the machine is used to produce at least one state signal calculated using said respective actual values.

11. (Currently amended) Apparatus for simulating the behavior of the mechanisms and drive control systems of a machine including at least two axes having respective different types of drive control systems and a digital controller, said digital controller in each cycle of the controller producing a respective desired axis value for each axis, said apparatus comprising:

auxiliary computer means for calculating respective actual values for the axes within a cycle of the digital controller using respective different types of axis drive control models and the respective desired axis values, said respective axis drive control models corresponding to the type of drive control provided for the respective axis; and

a mechanism model of the behavior of the axes in the mechanism of the machine, said mechanism model including at least one virtual sensor model producing a state signal calculated using said respective actual values, said state signal being supplied as feed back to the digital controller, at least one of the multiple axes having axes having NC-axis drive control and at least one of the multiple axes having a PLC-axis drive control, so that at least one NC-model and at least one PLC-model are used to compute the respective actual axis values, and wherein a geometric kinematic mechanism model of the behavior of the axes in the mechanism of the machine is used to produce at least one state signal calculated using said respective actual values.

12. (Currently amended) A method for simulation of the mechanical behavior of the mechanism of machine tools or production-line machines having multiple drive controllers for driving multiple axes, said method comprising the steps of:

producing respective desired axis values;

calculating respective actual axis values from the respective desired axis values simultaneously using mathematical models of drive controllers of the respective axes, said mathematical models including models of both regulated and unregulated drive controllers, ~~and~~ said mathematical models using said desired axis values;

generating a state signal using said actual axis values produced by said mathematical models of said drive controllers of the respective axes and mechanism model means for generating a state signal, said mechanism model means being connected for receiving said actual axis values from said mathematical model means; and

supplying said state signal to said digital controller as feedback, whereby both regulated and unregulated axes of the machine are simulated simultaneously, at least one of the multiple axes having NC-axis drive control and at least one of the multiple axes having a PLC-axis drive control, so that at least one NC-model and at least one PLC-model are used to compute the respective actual axis values, and wherein a geometric kinematic mechanism model of the behavior of the axes in the mechanism of the machine is used to produce at least one state signal calculated using said respective actual values.

13. (Currently amended) A method for simulating the mechanical behavior of the mechanism of machine tools or production-line machines having multiple drive controllers for driving multiple axes, and a digital controller, said digital controller in each cycle of the controller producing a respective desired axis value for each axis, said method comprising the steps of:

calculating respective actual axis values for the axes within a cycle of the digital controller using respective different types of axis drive control drive models corresponding to the type of control provided for the respective axis and the respective desired axis values; and

calculating a mechanism model of the behavior of the axes in the mechanism of the machine, said mechanism model providing at least one state signal calculated using said respective actual axis values, said state signal being supplied as feed back to the digital controller, at least one of the multiple axes having NC-axis drive control and at least one of the multiple axes having a PLC-axis drive control, so that at least one NC-model and at least one PLC-model are used to compute the respective actual axis values, and wherein a geometric kinematic mechanism model of the behavior of the axes in the mechanism of the machine is used to produce at least one state signal calculated using said respective actual values.